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DOES SLEEPTIGHT WORK? A BEHAVIORAL ANALYSIS OF THE EFFECTIVENESS OF SLEEPTIGHT FOR THE MANAGEMENT OF INFANT COLIC

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We evaluated the effectiveness of SleepTight in the management of infant colic. SleepTight is a device that vibrates the infant's crib to simulate the action of a car traveling at 55 mph. A multiple baseline design across 6 infants was used. Data were collected on infant crying, parental use of SleepTight, and parental satisfaction. The application of SleepTight was associated with reduction in crying in 4 of the 6 infants. These outcome data notwithstanding, consideration of reported nonrecording of severe episodes and mixed reports of satisfaction suggests that SleepTight may not be a viable means of managing infant colic.

DESCRIPTORS: infants, infant colic, crying

Infant colic is a common and distressing problem for parents as well as their babies (Illingworth, 1954; Paradise, 1966; Wessel, Cobb, Jackson, Harris, & Detwiler, 1954). A baby with colic is "one who, otherwise healthy and well-fed, (has) paroxysms of irritability, fussing or crying lasting for a total of more than three hours a day and occurring on more than three days in any week" (Carey, 1984). Colic typically has its onset at approximately 2 to 3 weeks of age and usually disappears by 12 weeks of age (Schmitt, 1985).

Recently, researchers have investigated specific interventions that may alter the course of colic, including elimination of cow's milk whey protein (Lothe & Lindberg, 1989), prescription of phenobarbital (O'Donovan & Bradstock, 1979), and provision of parental counseling (Taubman, 1988). Lothe and Lindberg showed that, among the 10% of infants with colic who were reactive to cow's milk, symptoms were exacerbated by ingestion of cow's milk protein. O'Donovan and Bradstock found that phenobarbital, a mild sedative, was no more effective than a placebo in diminishing colic symptoms. Despite the lack of data to support its effectiveness, phenobarbital remains a common treatment. Taubman compared the effectiveness of parental counseling with that of elimination of cow's milk. He reported a decrease in infant crying subsequent to counseling. No such decrease was found among those for whom cow's milk was eliminated. Regardless of the numerous recommendations provided in the literature, no treatment method has been shown empirically to be consistently successful in managing infant colic.

Loadman, Arnold, Volmer, Petrella, and Cooper (1987) suggested that continuous vibration provided by an electromechanical device (SleepTight) may be an effective method for reducing infants' crying. They reported that, subsequent to the introduction of SleepTight, colic severity was significantly reduced in 97% of the cases examined. Their results should be viewed with caution, however, given their study's methodological weaknesses. For example, no objective measures of the device's effectiveness were obtained. In the present study, we attempted to improve upon the methodology of the Loadman et al. study, providing a preliminary behavioral analysis of SleepTight's effectiveness.

METHOD

Infants

Fourteen infants, ranging in age from 2 to 8 weeks, were referred by two pediatricians because

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of colic. Referral was made after changes in formula, feeding techniques, and medication had failed to resolve the infants' symptoms. In eight of these cases, the parents chose not to participate because of an improvement in symptoms either prior to or during baseline.

At the time of referral, 3 of the remaining 6 infants (50% female) were receiving medication for colic (Infant 1: Levsin with phenobarbital; Infant 4: Levsin; and Infant 5: Mylicon). One family (Infant 3) initially chose not to follow their pediatrician's recommendation to medicate their baby with Levsin and phenobarbital. However, in the midst of our study, they elected to try the medication. Infants 2 and 6 did not receive any medication during the study. All but one of the participating infants (Infant 4) were first-born. A history of colic among the participants' relatives was noted in three families. Two families were unsure about the family history of colic, and one family reported no history of colic.

Parents

Parents' ages ranged from 25 to 38 years; all had completed high school and most had completed college. Only one mother was a full-time housewife; all other mothers were on maternity leave and were planning to return to full-time work outside the home. Annual family income averaged above $35,000 (range, $5,000 to $40,000+).

Setting and Apparatus

We conducted our study at the residences of the six participating infants and their families.

SleepTight is a two-part device (vibrator and sound generator) that, when attached to an infant's crib, vibrates the crib at a frequency said to be similar to that of a car traveling at 55 mph and simulates road noise (SleepTight, Inc., 3613 Mueller Road, St. Charles, Missouri, $70.00). The vibrator resembles an off-balanced motor encased in a small box. The vibrator is fastened to the springs underneath the infant's crib. A device that generates a sound similar to an automobile traveling at highway speed is attached to the bars on the side of the crib. SleepTight devices are available commercially (many drugstores and catalogs carry the device).

Target Behaviors, Data Collection, and Reliability Assessment

Loadman et al. (1987) developed a parent report scale to measure the severity of colic. This scale distinguishes three intensities of crying: fussing (whining or whimpering), crying (rhythmic crying), and wailing (full intensity crying). Because of the problems inherent in defining three different intensities of crying, these categories were combined into a broad class (crying) and compared against levels of quiet. Crying was defined as whining, whimpering, rhythmic crying, or wailing; quiet was defined as the absence of crying at any level of intensity.

Data were obtained through direct observation and via tape recordings of infant crying. Each family was provided with a battery-operated portable tape recorder (Sony TCM-848) and audiotapes. A 15-s interval recording system was used to quantify the duration of crying over periods of time ranging from 3 to 40 min.

Sessions occurred as frequently as five times in 1 day and as few as once in 2 weeks. The age in days for each infant on the 1st day of tape recording, the 1st day with SleepTight, and the last day with SleepTight were as follows: Infant 1 = 30, 33, 118 days; Infant 2 = 30, 35, 49 days; Infant 3 = 28, 36, 89 days; Infant 4 = 23, 28, 49 days; Infant 5 = 20, 25, 50 days; and Infant 6 = 56, 64, 118 days.

Using an exact agreement formula, levels of interobserver agreement for occurrence and nonoccurrence of crying were assessed in at least 25% of the sessions of each experimental condition for each participant by having a second observer independently score either directly or while listening to an audiotape. The average level of agreement for both occurrences and nonoccurrences was 96% (range, 83% to 100% and 88% to 100%, respectively).

Experimental Design and Procedures

A multiple baseline design across infants was used to evaluate the effects of the intervention.

Baseline. Immediately after referral, the first author visited the home of each infant to obtain a problem history and to observe and record the infant's crying behavior directly. At the time of this home visit, the parents were instructed to tape record their baby's colic episodes whenever they occurred, for at least 20 min.

No formula changes occurred during intervention. The two breast-fed babies (Infants 3 and 4) did not have any changes in feeding techniques either prior to or during the intervention. No instructions were given to the parents other than to manage colic episodes as in the past. They were expected to follow their pediatrician's recommendations concerning medication, if any applied. Such interventions are noted in Figure 1.

Treatment. The intervention consisted of the first author attaching SleepTight to the crib and providing the parents with a SleepTight instruction manual that recommended placement of the infant in the crib during each colic episode. The manual further specified that the machine be turned on after the child was placed in the crib, that the child should not be removed from the crib until 1 hr had elapsed, and that the device should be left on for no longer than 1 hr per episode. Following crib placement and device onset, parents were instructed to tape record colic episodes. The parents were told that, although SleepTight may not show immediate results, they should not terminate its use prematurely, that they may have to listen to a lot of crying, and that some type of distraction for the parent would probably be of benefit.

Telephone contact was maintained throughout the study to promote the parents' compliance with their instructions to audiotape (Rapoff & Christophersen, 1982) and to address any concerns. Initially, telephone calls were made as often as every day, with decreased frequency of calling over the course of the study. During these telephone contacts, the first author obtained information from the parents regarding the frequency of SleepTight use and their general impressions of its effectiveness. After an average of 4 months, no further telephone calls were made.

Follow-up assessment. A home visit was made at the end of the study to retrieve the SleepTight device, to determine if colic continued to be a problem, and to have the parents respond to a satisfaction questionnaire.

Parental Satisfaction

Parents were asked to answer, on a 4-point rating scale, four questions concerning the quality of service (e.g., how much the device helped, and whether they would recommend it to a friend). They were also asked to score, on a 7-point scale, nine questions regarding the effectiveness of the treatment procedure (e.g., how much they liked using SleepTight, how acceptable it was as a management technique, and their overall reaction to it) and nine questions regarding the study in general (e.g., their reaction to the length of the study and the home visits, and how comfortable they were with the therapist). Scores were averaged within each area to assess satisfaction with the SleepTight device.

RESULTS

With the introduction of SleepTight, a reduction in crying was found in 4 of the 6 infants, and a slight increase in crying was observed in the other 2 infants.

Crying

Figure 1 shows the percentage of intervals during which crying was observed across infants and across experimental conditions. Infants 1, 3, 4, and 5 revealed decreases in crying from baseline (M = 58%; range, 12% to 98%) to intervention conditions (M = 30%; range, 0% to 100%). Infants 2 and 6 experienced slight increases in crying from baseline (M = 41%; range, 0% to 100%) to intervention phases (M = 44%; range, 0% to 100%).

Use of SleepTight

The parents of Infants 1 and 6 reported consistent use of SleepTight. The parents of Infant 2 reported nonuse only twice. However, tape recordings revealed that Infant 2 was placed in his crib without the SleepTight device five times and was either held in his parents' arms, placed in a swing,

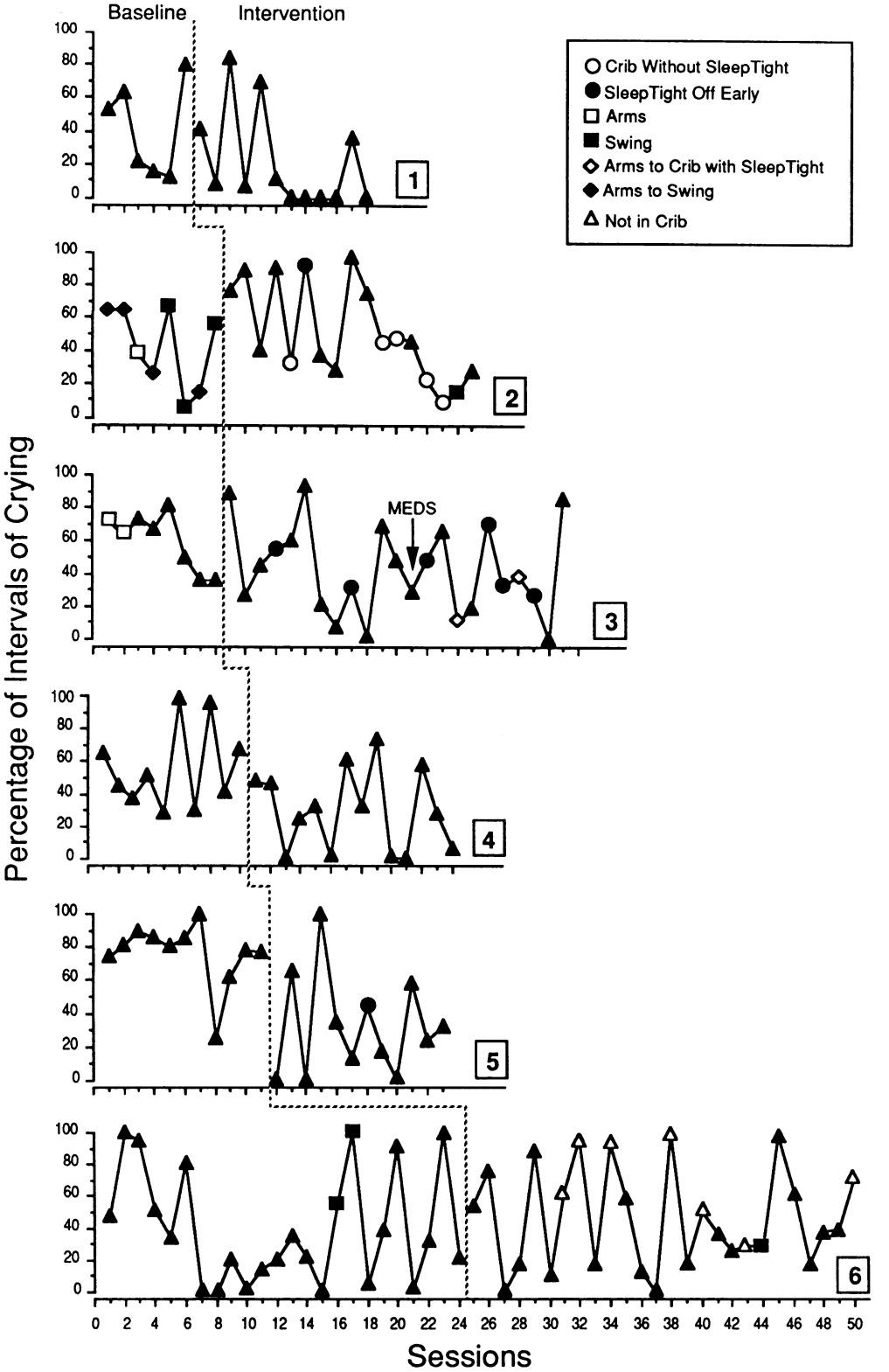

Figure 1. Percentage of intervals with crying across subjects and experimental conditions.

or both, seven times in baseline and once during intervention. There was no noticeable difference in the amount of crying between in-bed and in-swing/in-arms or between use and nonuse of SleepTight. The parents of Infant 3 reported minimal nonuse, which was confirmed by the tape recordings. Frequent nonuse of SleepTight was found for the parents of Infants 4 and 5.

Parental Satisfaction and Follow-Up

Ratings of satisfaction with SleepTight ranged from very satisfied to very dissatisfied. The parents of Infants 1 and 6 were very satisfied, the parents of Infant 2 were fairly dissatisfied, the parents of Infant 3 were neither satisfied nor dissatisfied, the parents of Infant 4 were very dissatisfied, and the parents of Infant 5 were fairly satisfied.

During the last home visit, parents of 5 of the 6 infants reported that colic was no longer a problem. The parents of Infant 6 reported that their child was still fussy, but they did not believe that further treatment was warranted.

DISCUSSION

Our findings are not entirely consistent with those of previous research (Loadman et al., 1987) on the effectiveness of SleepTight in the management of colic. Our data suggest that the use of the device improved colic symptoms for 4 of the 6 infants, but these effects were not fully corroborated by parental reports of use of and satisfaction with SleepTight. In three of the four successful cases, varying degrees of selective use of the SleepTight device were reported. In one case, Infant 4, the device received the maximum rating of dissatisfaction. Interestingly, the two cases in which crying worsened slightly, Infants 2 and 6, were those with the fewest reports of nonuse, thereby allowing the device the most thorough trial.

Two tentative conclusions can be drawn from the weak relationship between the data on crying and parental reports. The parents may not have perceived the effectiveness of SleepTight accurately. Alternatively, the data may not adequately reflect SleepTight's effectiveness, possibly as a result of its selective use.

There are several limitations to our study that deserve mention. Although our measurement system yielded relatively objective outcome data in regard to infant behavior, we were unable to manage or measure parental behavior. By report and direct observation, parents often seemed unable to forego previously used, ineffective methods of colic management (e.g., carrying or rocking their infant). For instance, in all but one case (Infant 1), parental attention to the infant was never consistently removed during the SleepTight condition. It is, therefore, unlikely that the observed effects during the intervention phase resulted from the consistent implementation of a time-out procedure (see Christophersen, 1990).

It is possible that the inconsistent use of SleepTight may have been a function of a pediatrician's or relative's advice that conflicted with our recommendations, rather than parental dissatisfaction with, or perceived ineffectiveness of, the device. Also, the fact that our study included only infants for whom previous treatment of colic had been unsuccessful leaves open the question of whether SleepTight would be more successful with milder cases of colic.

Given the time-limited nature of colic, future investigators may be well advised to consider enrollment of a larger sample of infants and to employ a randomized group design. Although not the case in this study, a multiple baseline design may bias results in favor of any particular intervention for a problem such as colic that typically remits spontaneously.

Research should continue in the area of infant colic until an acceptable management technique is demonstrated to be effective. Videotaping parent and infant behavior and use of new technology (such as a switch-mat or photoelectric devices for detecting movement around an infant's crib) may provide a more objective evaluation of how parents manage their infant's colic (France & Hudson, 1990). Future efforts may also examine the impact of therapist support (e.g., telephone contact) on parental satisfaction with a treatment procedure. Most of the parents in this study reported that such support was very beneficial to them.

A greater understanding of infant colic may be achieved if assessment and treatment procedures match the complexity and heterogeneity of the problem. For instance, SleepTight may be most beneficial for a particular group of infants with relatively mild cases of colic or for those infants who do not exhibit physical symptoms such as excessive gas and apparent abdominal pain. Alternative procedures, such as medication and formula changes, may be effective with infants who are immediately diagnosed and who do not experience multiple misdirected attempts to remedy the colic symptoms, resulting in an operant overlay.

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